Presentation to:

Enabling Technologies for Advancing Load Response Programs

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Powerweb Technologies

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Outline

- Who is Powerweb?
- Who are our customers?
- Distributed Resources Software Design
- Real Time Metering
- Internet Controlled Lighting
- Generator Control
- Internet Thermostat Control
- Case Study - Aventis Pharmaceutical
- Notification Methods
- Settlement Services

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Who is Powerweb Technologies?

- Privately owned corporation founded in 1991 located in suburban Philadelphia

- Developed and patented a distributed resource platform that allows end use customers curtail load through Internet enabled devices

- Fully operational web-based systems

- Over 7 years experience installing turnkey IT solutions

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Who are our customers?

Powerweb's Products

1. *The Omni-Link Internet Platform*

Real Time PJM Pricing, Instant Curtailment Notification, Energy Settlement, and Load Curtailment Control to provide income which covers the cost of equipment.

2. *Internet Metering*

Real Time Metering to facilitate verifiable load curtailment and settlement without connection to the grid.

3. *Internet Dimmable Lighting*

Internet Control of Westinghouse Retrolux Dimming System allowing for NegaWatts to be sold back to the grid

4. *Integration to O'Brien Energy Generators and Cogeneration Equipment*

5. *Internet Controlled Thermostats*

4 Steps to Successful Demand Reduction

1. Notification
   - Price and Reliability Alerts now redistributed instantaneously through e-mails, pagers, cell phones, & PDA's.
   - Trigger Price Setting
2. "Real-Time" Metering Compliance
   - Instant feedback on metering demand
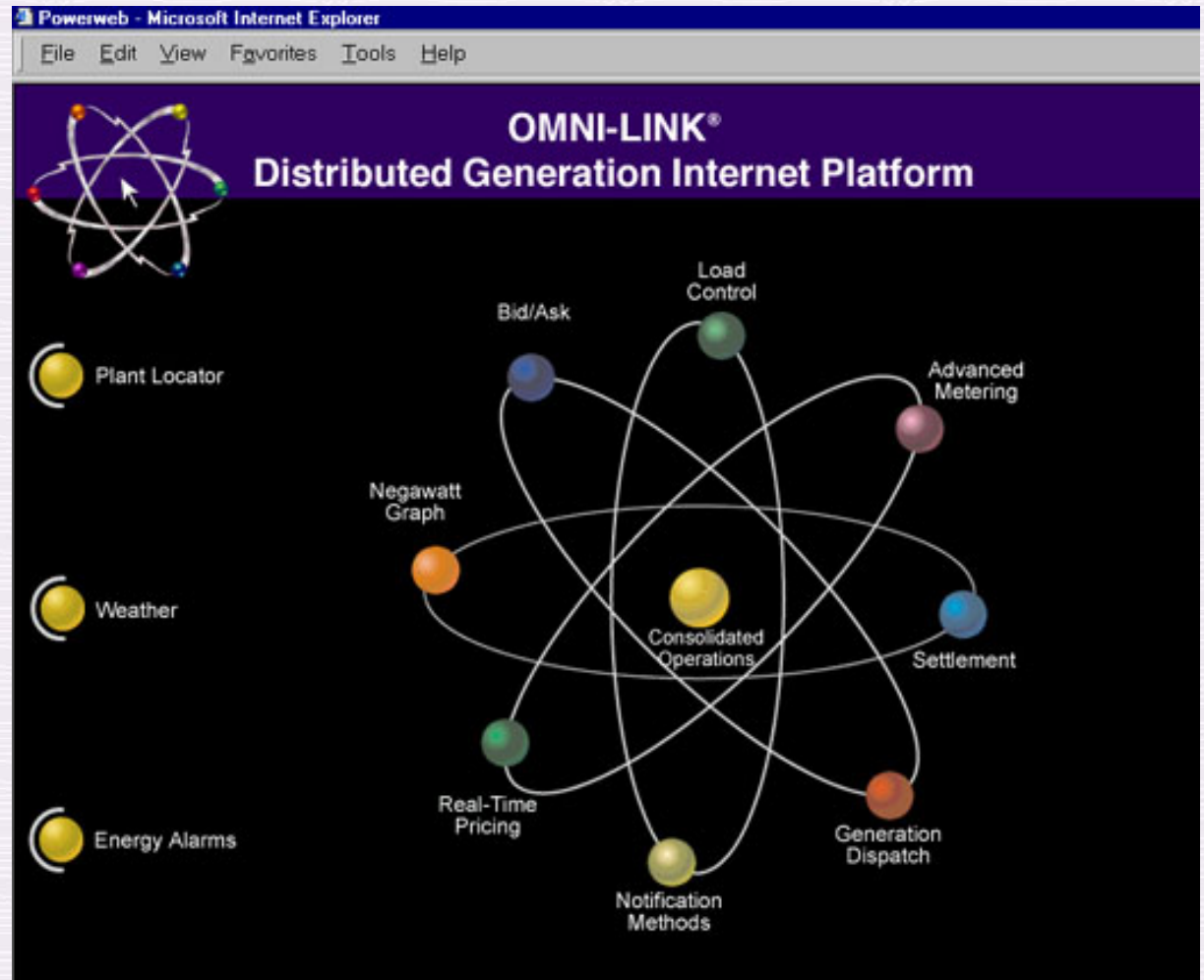   - Instant feedback on curtailment activities
3. Curtailment
   - Internet-based automated curtailment
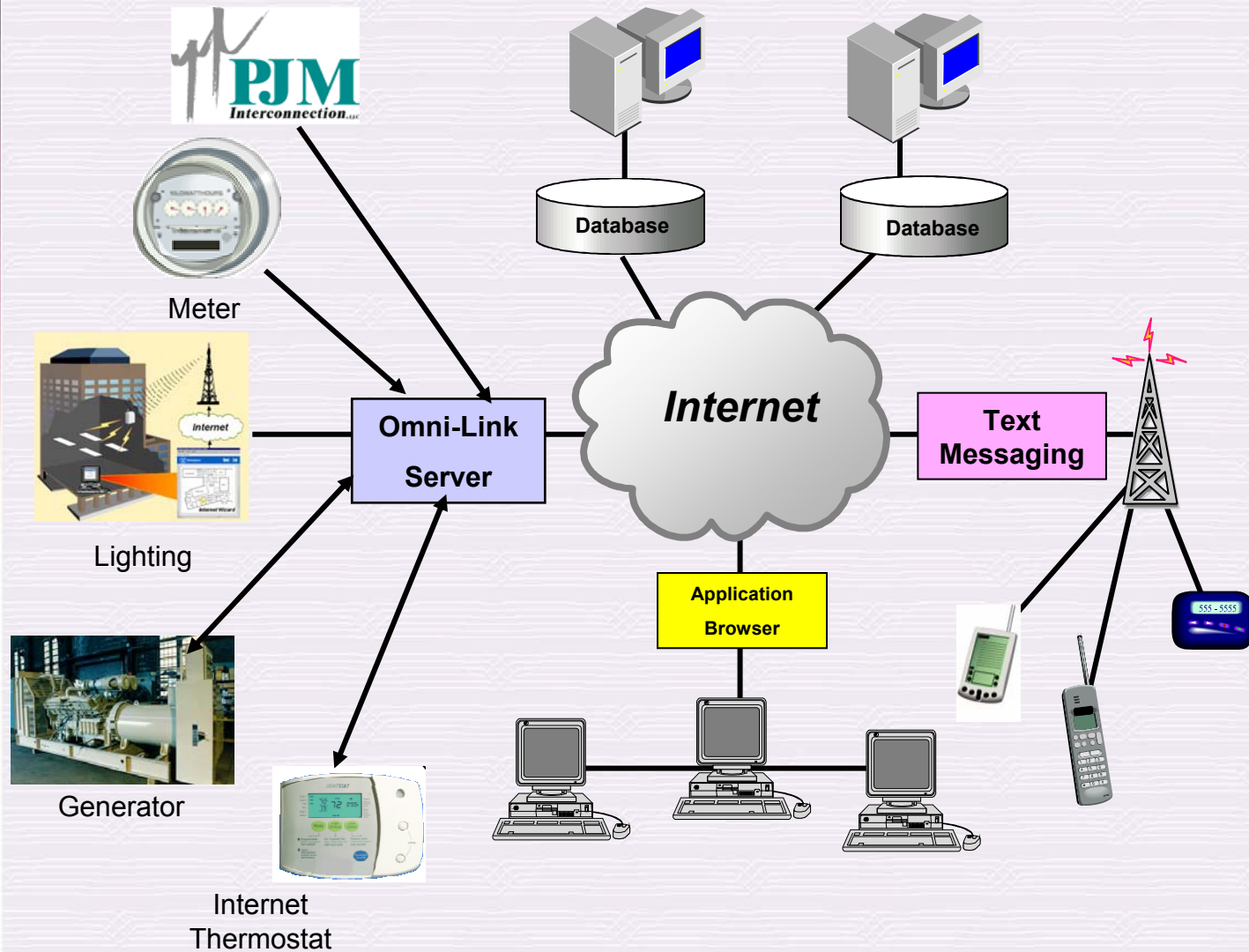   - User-Friendly dispatch capabilities
4. Settlement
   - Automated Settlement
   - Instant "Nega-watt" calculation

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Omni-Link Software Platform for Distributed Resources

Hardware & Software Integration

Meter

Lighting

Generator

Internet Thermostat

PJM Interconnection, LLC

Omni-Link Server

Internet

Database

Database

Text Messaging

Application Browser

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Wireless Real Time Metering

Meter

Paging Tower

Network Operations Center

Powerweb Internet Servers & Database

Application Browser

Demand Contacts

Wireless Communicator

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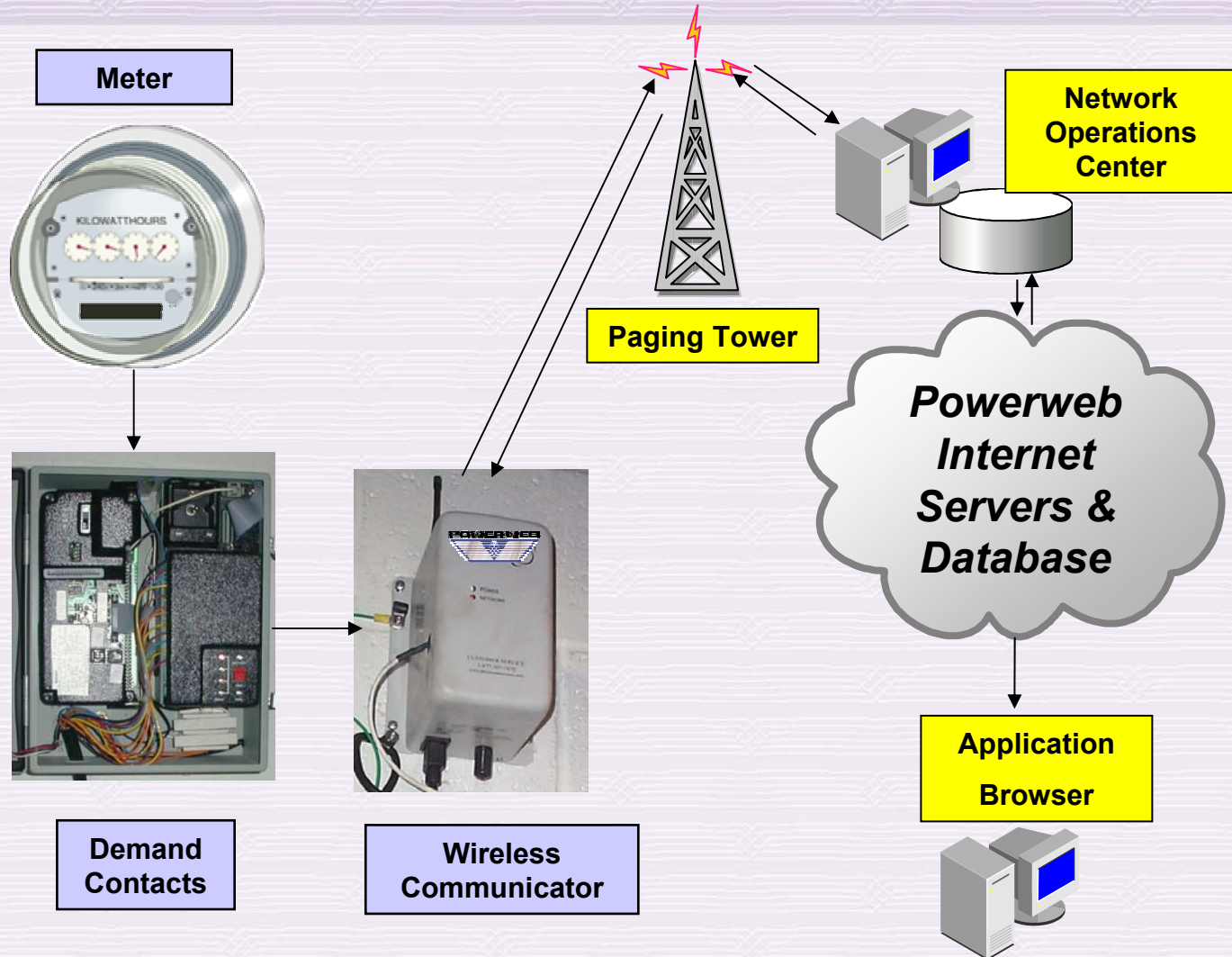
Retrolux Lighting System

Snaps into lampholder – no wiring   **Original ballast remains untouched**

Dimming and Demand Response Savings

Energy Savings

	4 Lamp
# of Fixtures	200
Wattage of Existing Fixture	181
Wattage of Retrofit	96
Wattage Savings	85
Burn Hours/Year	3,500
kWh savings per fixture	297.5
Total kWh Savings	59,500
Energy Savings $.10/kWh	$5,950
Dimming Savings (20%)	$1,190
Sell Back to Grid (200 hrs)	$576
Total Energy Savings/facility	$7,716
Energy Savings per fixture	**$38.58**

Equipment and Labor Costs

	4 Lamp
Ballast/Lamp Combo per fixture	$60
Equipment Costs	$12,000
Software/Hardware Costs	$500
Labor Costs ($5.00)	$1,000
Total Costs	$13,560
Total Cost per fixture	**$68**

Savings Analysis

Energy Savings	$38.58
Equipment Costs	$68
Simple Payback	**1.8**

- **Dimming Controlled by 2 way paging signal**

- **Each fixture can be dimmed down to 50 % energy reduction**

- **Each facility would be accessible over the Internet via an Internet wizard**

- **Sell back energy to power grid during Peak Demand days.**
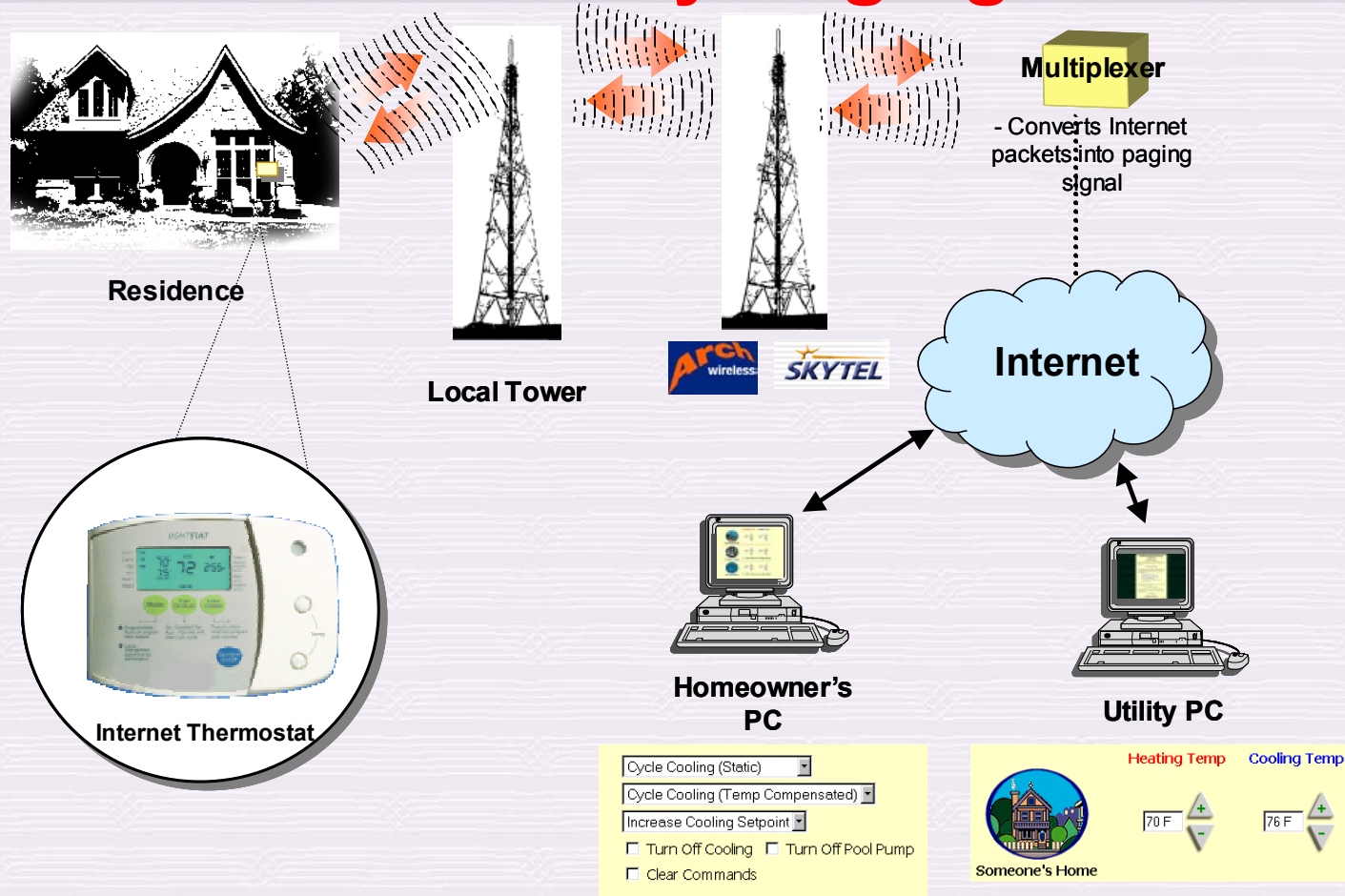
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Generation Control

- Integration with Operations Control Software to run generators or chillers

- Generators start up according to dynamic spot prices

- Sell Back Power to the Grid during volatile price periods

- Real Time Calculations of Generating Value available on the Internet

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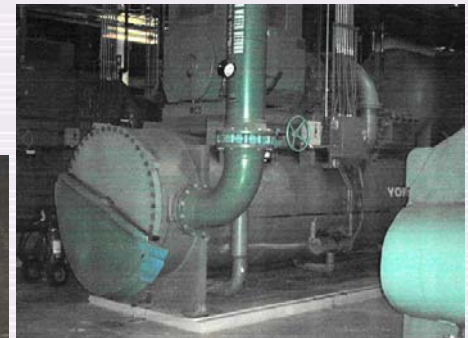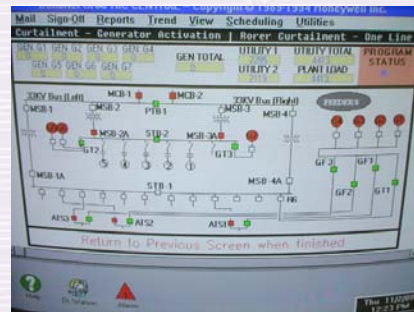
Internet Thermostat Technology
Two-Way Paging

Residence

Internet Thermostat

Local Tower

Multiplexer

- Converts Internet packets into paging signal

Internet

Homeowner's PC

Utility PC

Cycle Cooling (Static)
Cycle Cooling (Temp Compensated)
Increase Cooling Setpoint
☐ Turn Off Cooling   ☐ Turn Off Pool Pump
☐ Clear Commands

Someone's Home

Heating Temp   Cooling Temp

70 F   76 F

Advantages:Temp. Read, On/Off Status, Message Receipt

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Case History

- Pharmaceutical R&D Facility
- 10 Years Old
- 12 MW of Load
- 10 MW of Standby Generation
- Honeywell Control System
- Fixed Price Utility Tariff

Opportunity

- Deregulation allowed for third party suppliers to buy capacity directly from customer.

- PJM Load Response Program allowed for energy payments directly to customer.

- Customer seeking ways for secondary use of generating assets.

- Fixed Utility Payments causing substantial losses for utility.

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Solution

- Bid Out Capacity to Third Parties
  - Highest Bid $75/MW-day - $275,000
  - Mandatory availability from June through September
  - Available between Noon and 8 PM
  - Maximum duration 6 hours
- Join PJM program
  - Voluntary
  - Minimum Energy Payments of 50 c/kWh
- Sell Energy During other times to Utility
  - Set Trigger Prices >10c/kWh
  - Receive Wireless notice
  - Start Generators and Reduce chiller load
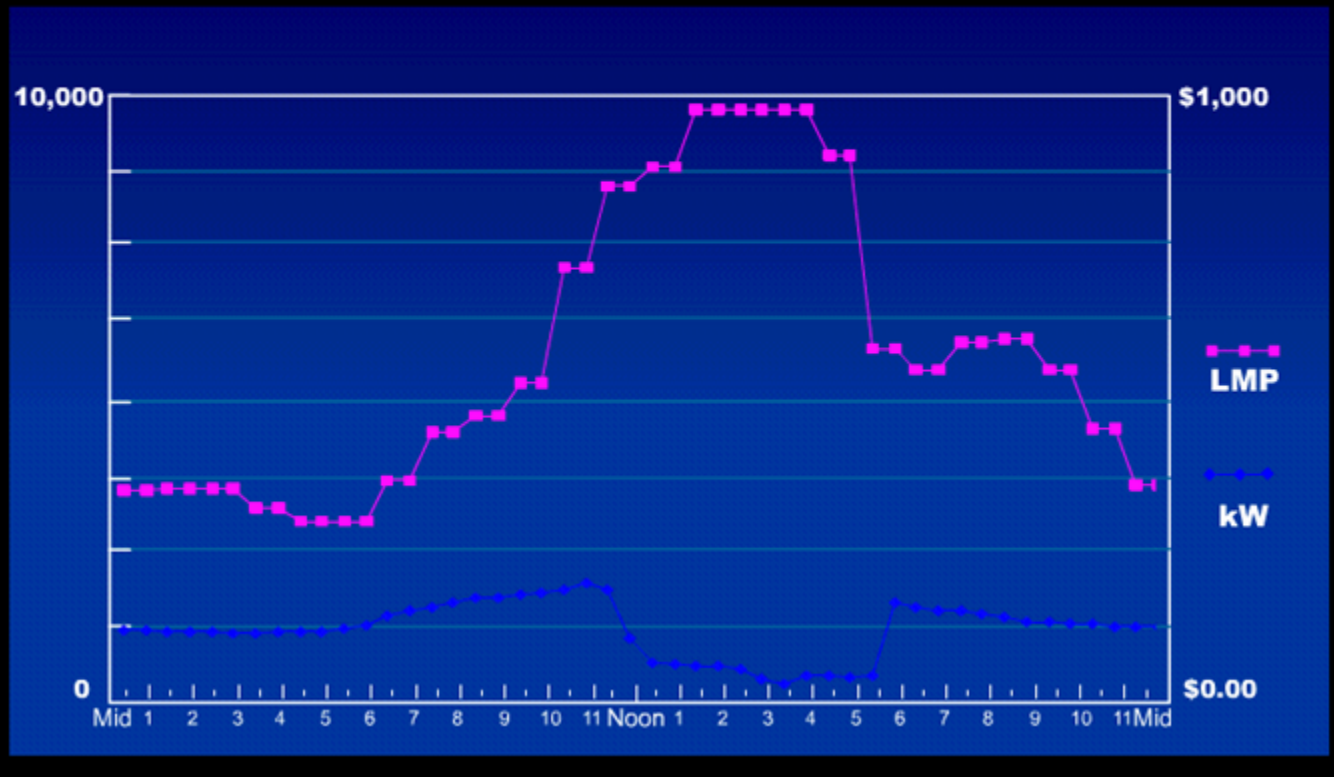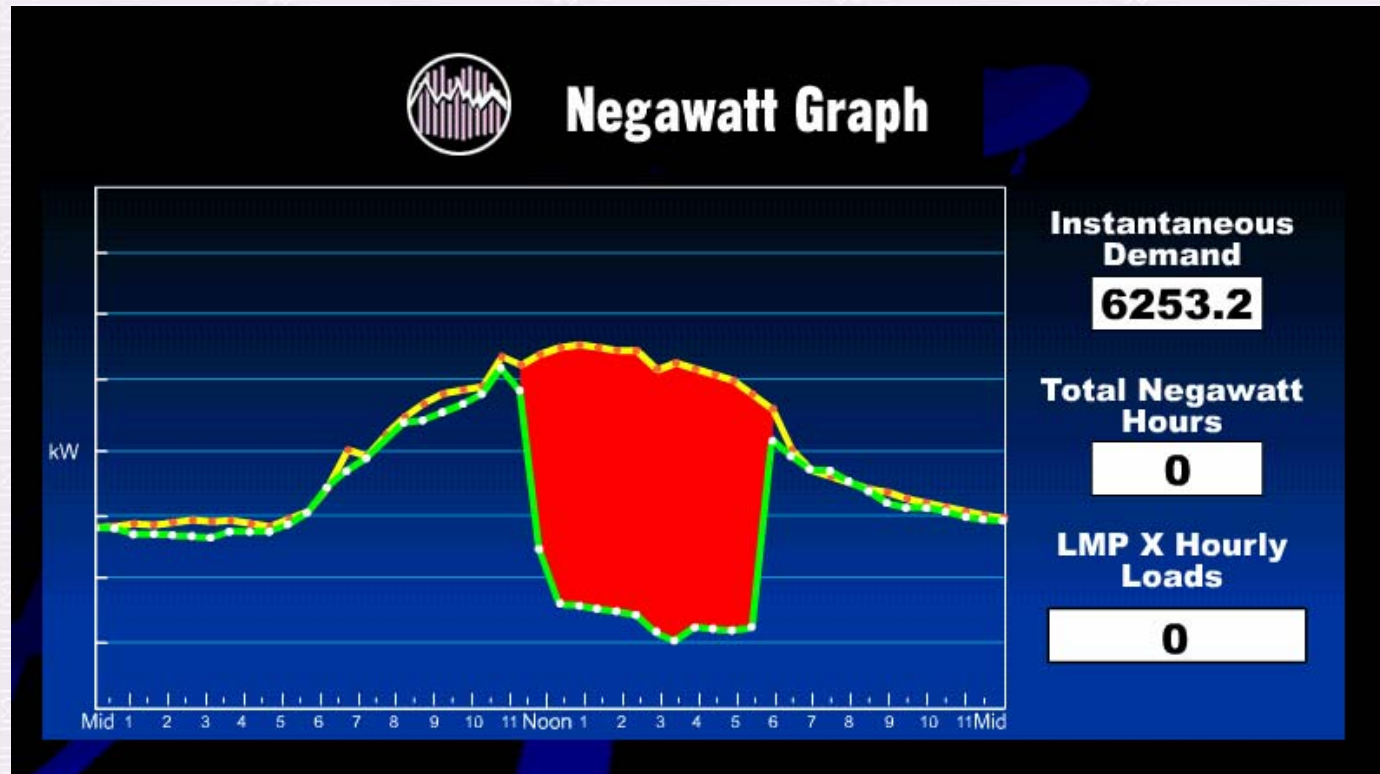
Real-Time Metering
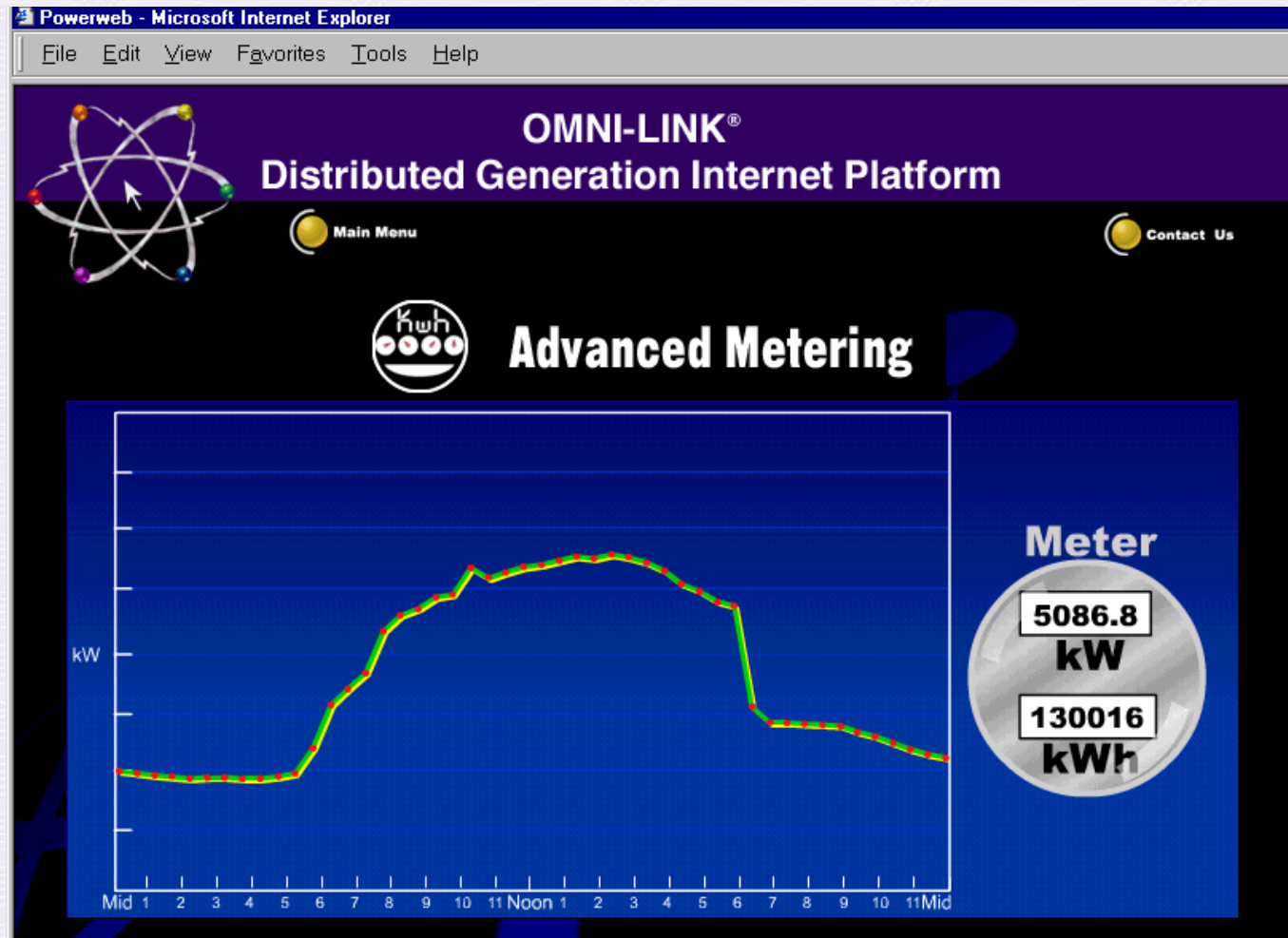
Real-Time Load and Prices
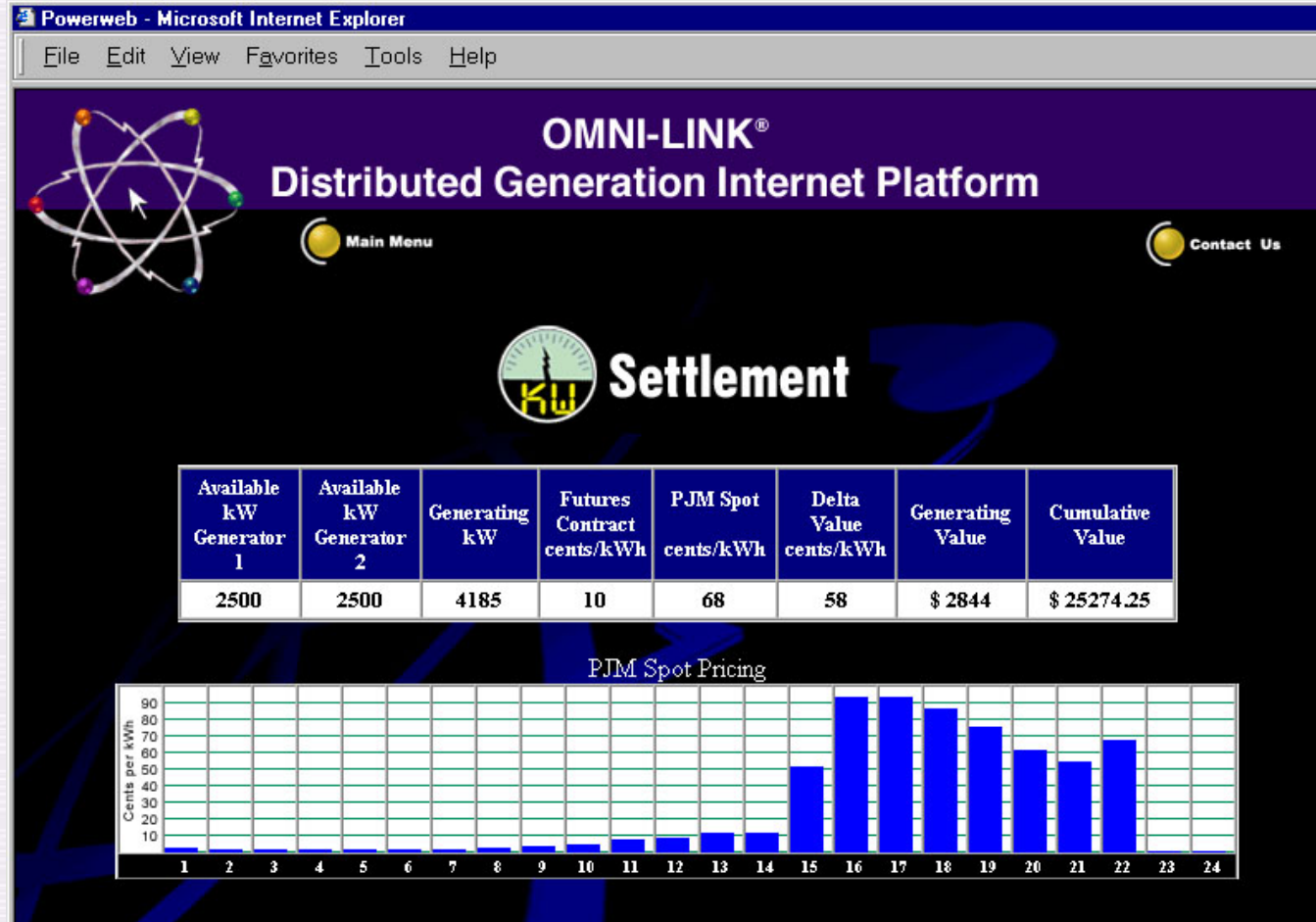
NegaWatt Calculation

Settlement Software

Notification Process "ePoweralert.com"

PJMTechnologies, Inc.

- Trigger Prices Set
- Continuous monitoring of PJM Spot Price
- Automatic Notification of Triggers

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Summary of Powerweb's Capabilities

- Software is available today.
  - Lighting Control
  - Generation Control
  - Thermostat Control
- Distributed Resources Platform custom designed around the PJM program
- Near real-time or real-time demand information available
- Platform's value add to Utilities, ESCO's, End Users
  - Reduced exposure in Market
  - Aggregate look of all the curtailment customers
  - Increased reliability
  - Increased earnings/share
  - Increased customer satisfaction ratings

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